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PATENT TRADEMARK OFFICE

CHAPTER II

**TRANSMITTAL LETTER
TO THE UNITED STATES ELECTED OFFICE (EO/US)**

(ENTRY INTO U.S. NATIONAL PHASE UNDER CHAPTER II)

INTERNATIONAL APPLICATION NO. PCT/RU00/00386	INTERNATIONAL FILING DATE 28 SEPTEMBER 2000	PRIORITY DATE CLAIMED 5 OCTOBER 1999
TITLE OF INVENTION HIGHLY RESISTANT ALUMINUM-BASED ALLOY AND ARTICLE MADE FROM SAID ALLOY		
APPLICANT(S) 1. IOSIF NAUMOVICH FRIDLYANDER 2. EVGENY NIKOLAEVICH KABLOV 3. EVGENIYA ANATOLIEVNA TKACHENKO 4. VLADIMIR NIKOLAEVICH SAMONIN 5. VIKTOR YAKOVLEVICH VALKOV		

Box PCT
Assistant Commissioner for Patents
Washington D.C. 20231
ATTENTION: EO/US

CERTIFICATION UNDER 37 C.F.R. 1.10*
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(Express Mail certification is optional.)

I hereby certify that this correspondence and the documents referred to as attached therein are being deposited with the United States Postal Service on this date April 1, 2002, in an envelope as "Express Mail Post Office to Addressee," Mailing Label Number EV 011021457 US, addressed to the: Assistant Commissioner for Patents, Washington, D.C. 20231.

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(Transmittal Letter to the United States Elected Office (EO/US)—page 1 of 9) 13-18

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NOTE: The completion of those filing requirements that can be made at a time later than 30 months from the priority date results from the Commissioner exercising his judgment under the authority granted under 35 USC 371(d). The filing receipt will show the actual date of receipt of the last item completing the entry into the national phase. See 37 C.F.R. §1.491 which states: "An international application enters the national state when the applicant has filed the documents and fees required by 35 USC 371(c) within the periods set forth in § 1.494 and § 1.495."

WARNING: Where the items are those which can be submitted to complete the entry of the international application into the national phase are subsequent to 30 months from the priority date the application is still considered to be in the international state and if mailing procedures are utilized to obtain a date the express mail procedure of 37 C.F.R. §1.10 must be used (since international application papers are not covered by an ordinary certificate of mailing - See 37 C.F.R. §1.8).

NOTE: Documents and fees must be clearly identified as a submission to enter the national state under 35 USC 371 otherwise the submission will be considered as being made under 35 USC 111. 37 C.F.R. § 1.494(f).

1. Applicant herewith submits to the United States Elected Office (EO/US) the following items under 35 U.S.C. 371:

- a. ☒ This express request to immediately begin national examination procedures (35 U.S.C. 371(f)).
- b. ☒ The U.S. National Fee (35 U.S.C. 371(c)(1)) and other fees (37 C.F.R. § 1.492) as indicated below:

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2.

*May include Preliminary Amendment (see page 8) reducing the number of claims.

- i. ☒ A check in the amount of \$ 1,040.00 to cover the above fees is enclosed.
- ii. ☐ Please charge Account No. _____ in the amount of \$ _____.
A duplicate copy of this sheet is enclosed.

****WARNING:** "To avoid abandonment of the application the applicant shall furnish to the United States Patent and Trademark Office not later than the expiration of 30 months from the priority date: * * * (2) the basic national fee (see § 1.492(a)). The 30-month time limit may not be extended." 37 C.F.R. § 1.495(b).

WARNING: If the translation of the international application and/or the oath or declaration have not been submitted by the applicant within thirty (30) months from the priority date, such requirements may be met within a time period set by the Office. 37 C.F.R. § 1.495(b)(2). The payment of the surcharge set forth in § 1.492(e) is required as a condition for accepting the oath or declaration later than thirty (30) months after the priority date. The payment of the processing fee set forth in § 1.492(f) is required for acceptance of an English translation later than thirty (30) months after the priority date. Failure to comply with these requirements will result in abandonment of the application. The provisions of § 1.136 apply to the period which is set. Notice of Jan. 3, 1993, 1147 O.G. 29 to 40.

- ☐ Applicant hereby asserts status as a small entity under 37 C.F.R. § 1.27.
☐ A Statement or Written Assertion is attached.

NOTE: 37 C.F.R. § 1.27(c) deals with the assertion of small entity status, whether by a written specific declaration thereof or by payment as a small entity of the basic filing fee or the fee for the entry into the national phase as states:

"(c) Assertion of small entity status. Any party (person, small business concern or nonprofit organization) should make a determination, pursuant to paragraph (f) of this section, of entitlement to be accorded small entity status based on the definitions set forth in paragraph (a) of this section, and must, in order to establish small entity status for the purpose of paying small entity fees, actually make an assertion of entitlement to small entity status, in the manner set forth in paragraph (c)(1) or (c)(3) of this section, in the application or patent in which such small entity fees are to be paid.

- (1) Assertion by writing. Small entity status may be established by a written assertion of entitlement to small entity status. A written assertion must:
 - (i) Be clearly identifiable;
 - (ii) Be signed (see paragraph (c)(2) of this section); and
 - (iii) Convey the concept of entitlement to small entity status, such as by stating that applicant is a small entity, or that small entity status is entitled to be asserted for the application or patent. While no specific words or wording are required to assert small entity status, the intent to assert small entity status must be clearly indicated in order to comply with the assertion requirement.
- (2) Parties who can sign and file the written assertion. The written assertion can be signed by:
 - (i) One of the parties identified in §§ 1.33(b) (e.g., an attorney or agent registered with the Office), §§ 3.73(b) of this chapter notwithstanding, who can also file the written assertion;
 - (ii) At least one of the individuals identified as an inventor (even though a § 1.63 executed oath or declaration has not been submitted), notwithstanding §§ 1.33(b)(4), who can also file the written assertion pursuant to the exception under §§ 1.33(b) of this part; or
 - (iii) An assignee of an undivided part interest, notwithstanding §§ 1.33(b)(3) and 3.73(b) of this chapter, but the partial assignee cannot file the assertion without resort to a party identified under §§ 1.33(b) of this part.

(3) Assertion by payment of the small entity basic filing or basic national fee. The payment, by any party, of the exact amount of one of the small entity basic filing fees set forth in §§ 1.16(a), (f), (g), (h), or (k), or one of the small entity basic national fees set forth in §§ 1.492(a)(1), (a)(2), (a)(3), (a)(4) or (a)(5), will be treated as a written assertion of entitlement to small entity status even if the type of basic filing or basic national fee is inadvertently selected in error.

(i) If the Office accords small entity status based on payment of a small entity basic filing or basic national fee under paragraph (c)(3) of this section that is not applicable to that application, any balance of the small entity fee that is applicable to that application will be due along with the appropriate surcharge set forth in §§ 1.16(e) or §§ 1.16(l).

(ii) The payment of any small entity fee other than those set forth in paragraph (c)(3) of this section (whether in the exact fee amount or not) will not be treated as a written assertion of entitlement to small entity status and will not be sufficient to establish small entity status in an application or a patent."

3. ☒ A copy of the International application as filed (35 U.S.C. 371(c)(2)):

NOTE: Section 1.495 (b) was amended to require that the basic national fee and a copy of the international application must be filed with the Office by 30 months from the priority date to avoid abandonment "The International Bureau normally provides the copy of the international application to the Office in accordance with PCT Article 20. At the same time, the International Bureau notifies applicant of the communication to the Office. In accordance with PCT Rule 47.1, that notice shall be accepted by all designated offices as conclusive evidence that the communication has duly taken place. Thus, if the applicant desires to enter the national stage, the applicant normally need only check to be sure the notice from the International Bureau has been received and then pay the basic national fee by 30 months from the priority date." Notice of Jan. 7, 1993, 1147 O.G. 29 to 40, at 35-36. See item 14c below.

- a. ☒ is transmitted herewith.
- b. ☐ is not required, as the application was filed with the United States Receiving Office.
- c. ☐ has been transmitted
 - i. ☐ by the International Bureau.
Date of mailing of the application (from form PCT/IB/308): _____.
 - ii. ☐ by applicant on _____
Date

4. ☒ A translation of the International application into the English language (35 U.S.C. 371(c)(2)):

- a. ☒ is transmitted herewith.
- b. ☐ is not required as the application was filed in English.
- c. ☐ was previously transmitted by applicant on _____
Date
- d. ☐ will follow.

10. ☒ An oath or declaration of the inventor (35 U.S.C. 371(c)(4)) complying with 35 U.S.C. 115
- a. ☐ was previously submitted by applicant on _____.
Date
- b. ☐ is submitted herewith, and such oath or declaration
- i. ☐ is attached to the application.
- ii. ☐ identifies the application and any amendments under PCT Article 19 that were transmitted as stated in points 3(b) or 3(c) and 5(b); and states that they were reviewed by the inventor as required by 37 C.F.R. 1.70.
- c. ☒ will follow.

Other document(s) or information included:

11. ☒ An International Search Report (PCT/ISA/210) or Declaration under PCT Article 17(2)(a):
- a. ☒ is transmitted herewith.
- b. ☐ has been transmitted by the International Bureau.
Date of mailing (from form PCT/IB/308): _____.
- c. ☐ is not required, as the application was searched by the United States International Searching Authority.
- d. ☐ will be transmitted promptly upon request.
- e. ☐ has been submitted by applicant on _____.
Date
12. ☒ An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98:
- a. ☐ is transmitted herewith.
Also transmitted herewith is/are:
☐ Form PTO-1449 (PTO/SB/08A and 08B).
☐ Copies of citations listed.
- b. ☒ will be transmitted within THREE MONTHS of the date of submission of requirements under 35 U.S.C. 371(c).
- c. ☐ was previously submitted by applicant on _____.
Date
13. ☐ An assignment document is transmitted herewith for recording.

A separate ☐ "COVER SHEET FOR ASSIGNMENT (DOCUMENT) ACCOMPANYING NEW PATENT APPLICATION" or ☐ FORM PTO 1595 is also attached.

14. ☒ Additional documents:
- a. ☒ Copy of request (PCT/RO/101)
 - b. ☒ International Publication No. WO 01/25498 A1
 - i. ☐ Specification, claims and drawing
 - ii. ☒ Front page only
 - c. ☒ Preliminary amendment (37 C.F.R. § 1.121)
 - d. ☒ Other

FORM PCT/IB/304; FORM PCT/IB/306; FORM PCT/IPEA/401 (DEMAND)
CERTIFICATE OF CHANGE OF THE APPLICANT'S NAME

15. ☒ The above checked items are being transmitted
- a. ☒ before 30 months from any claimed priority date.
 - b. ☐ after 30 months.
16. ☐ Certain requirements under 35 U.S.C. 371 were previously submitted by the applicant on _____, namely:
- _____
- _____
- _____

AUTHORIZATION TO CHARGE ADDITIONAL FEES

WARNING: *Accurately count claims, especially multiple dependent claims, to avoid unexpected high charges if extra claims are authorized.*

NOTE: *"A written request may be submitted in an application that is an authorization to treat any concurrent or future reply, requiring a petition for an extension of time under this paragraph for its timely submission, as incorporating a petition for extension of time for the appropriate length of time. An authorization to charge all required fees, fees under § 1.17, or all required extension of time fees will be treated as a constructive petition for an extension of time in any concurrent or future reply requiring a petition for an extension of time under this paragraph for its timely submission. Submission of the fee set forth in § 1.17(a) will also be treated as a constructive petition for an extension of time in any concurrent reply requiring a petition for an extension of time under this paragraph for its timely submission." 37 C.F.R. § 1.136(a)(3).*

NOTE: *"Amounts of twenty-five dollars or less will not be returned unless specifically requested within a reasonable time, nor will the payer be notified of such amounts; amounts over twenty-five dollars may be returned by check or, if requested, by credit to a deposit account." 37 C.F.R. § 1.26(a).*

☒ The Commissioner is hereby authorized to charge the following additional fees that may be required by this paper and during the entire pendency of this application to Account No. 12-0425.

☒ 37 C.F.R. 1.492(a)(1), (2), (3), and (4) (filing fees)

WARNING: *Because failure to pay the national fee within 30 months without extension (37 C.F.R. § 1.495(b)(2)) results in abandonment of the application, it would be best to always check the above box.*

☐ 37 C.F.R. 1.492(b), (c) and (d) (presentation of extra claims)

NOTE: *Because additional fees for excess or multiple dependent claims not paid on filing or on later presentation must only*

be paid or these claims cancelled by amendment prior to the expiration of the time period set for response by the PTO in any notice of fee deficiency (37 C.F.R. § 1.492(d)), it might be best not to authorize the PTO to charge additional claim fees, except possible when dealing with amendments after final action.

- ☒ 37 C.F.R. 1.17 (application processing fees)
- ☒ 37 C.F.R. 1.17(a)(1)-(5)(extension fees pursuant to § 1.136(a).
- ☒ 37 C.F.R. 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 C.F.R. 1.311(b))

NOTE: Where an authorization to charge the issue fee to a deposit account has been filed before the mailing of a Notice of Allowance, the issue fee will be automatically charged to the deposit account at the time of mailing the notice of allowance. 37 C.F.R. § 1.311(b).

NOTE: 37 C.F.R. 1.28(b) requires "Notification of any change in loss of entitlement to small entity status must be filed in the application . . . prior to paying, or at the time of paying . . . issue fee." From the wording of 37 C.F.R. § 1.28(b): (a) notification of change of status must be made even if the fee is paid as "other than a small entity" and (b) no notification is required if the change is to another small entity.

- ☐ 37 C.F.R. § 1.492(e) and (f) (surcharge fees for filing the declaration and/or filing an English translation of an International Application later than 30 months after the priority date).


SIGNATURE OF PRACTITIONER

WILLIAM R. EVANS

(type or print name of practitioner)

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of : IOSIF NAUMOVICH FRIDLYANDER, et al
International Application No. : PCT/RU00/00386
International Filing Date: : 28 SEPTEMBER 2000
Priority Date Claimed : 5 OCTOBER 1999
For : HIGHLY RESISTANT ALUMINUM-BASED ALLOY
AND ARTICLE MADE FROM SAID ALLOY
Attorney Docket No. : U 013961-3

Assistant Commissioner for Patents
Washington, D.C. 20231

PRELIMINARY AMENDMENT

Please amend the above identified application as follows:

IN THE CLAIMS

3. (Amended) High strength aluminum-based alloy of claim 1, characterized
in that the ratio Si:Be ≥ 2 .

CERTIFICATION UNDER 37 C.F.R. 1.8(a) and 1.10*

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37 C.F.R. 1.8(a)

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37 C.F.R. 1.10*



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☐ transmitted by facsimile to the Patent and Trademark Office.

Date: APRIL 1, 2002

Signature

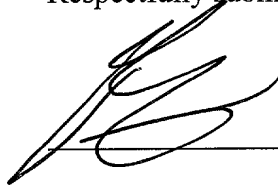
Connie Yannotti

(type or print name of person certifying)

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"Since the filing of correspondence under § 1.10 without the Express Mail mailing label thereon is an oversight that can be avoided by the exercise of reasonable care, requests for waiver of this requirement will **not** be granted on petition." Notice of Oct. 24, 1996, 60 Fed. Reg. 56,439, at 56,442.

Respectfully submitted,



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MARKED-UP COPY

3. (Amended) High strength aluminum-based alloy of claim 1, [2]
characterized in that the ratio Si:Be ≥ 2 .

High Strength Aluminium Based Alloy and the Article Made Thereof

Field of the Invention.

This invention relates to non-ferrous metallurgy, and in particular it relates to high strength aluminium based alloys of Al-Zn-Mg-Cu system. The invented alloy is suitable for producing extruded, rolled and forged semiproducts (mainly articles having large sections) used for manufacture loaded members of aircraft, lorries and cars, seagoing and river vessels, agricultural machinery.

Background of the Invention.

Al-Zn-Mg-Cu alloys are widely used in the aircraft and aerospace industries. Well-known is the Russian alloy of said system comprising (mass.%):

Zn 6.5-7.3	Fe 0.2-0.4
Mg 1.6-2.2	Si <0.2
Cu 0.8-1.2	Al-balance

Said alloy doesn't provide high (UTS, YTS) properties and fracture toughness (K_{IC}). The articles made from said alloy have limited efficiency in weight and unsatisfactory service life (Handbook, Aluminium alloys, 1984, Moscow, publ. "Metallurgy").

The American alloys of Al-Zn-Mg-Cu system (7000 series) developed by ALCOA are also well-known. For instance, the alloy described in US Patent 4.828.631 comprises (in mass.%):

Zn 5.9-8.2	Ti < 0.06
Mg 1.5-4.0	Si < 0.12
Cu 1.5-3.0	Fe < 0.15
Zr 0.08-0.15	impurities < 0.05 each and < 0.15 in total
B < 0.01	Al-balance
Cr < 0.4	

This alloy has been developed for particular use in aircraft and aerospace articles. It has superior exfoliation corrosion resistance, but its hardenability is sacrificed. In case the semiproduct has the thickness of more than 100 mm, the service characteristics (fracture toughness, strength, plasticity, corrosion resistance and uniformity of properties in semiproducts' volume) become worse. All these shortcomings do not allow to produce large - sized articles from said alloy.

The alloy described in US Patent 4.832.758 comprises (in mass.%):

Zn 4.0-8.0

Mg 1.5-3.0

Cu 1.0-2.5

5 at least one element from the group:

Cr 0.05-0.3

Mn 0.1-0.5

Zr 0.05-0.3

Al-balance

10 This alloy is intended to be used for producing semiproducts (plates) of the limited thickness (not more than 64 mm) because when increasing the thickness of a semiproduct, its mechanical properties, fracture toughness and corrosion resistance are essentially reduced.

The alloy disclosed in EP 0829552 comprises (in mass.%):

15 Zn 5.2-6.8 Si ≤ 0.06

Mg 1.6-2.1 Fe ≤ 0.06

Cu 1.75-2.4 Fe+Si ≤ 0.11

Zr 0.08-0.15 Al-balance

20 This alloy may be used for manufacture of wing members of jet aircraft, mainly spars, lower skins, etc. The disadvantage of this alloy is its' high sensibility to quenching rate which leads to sharp reducing the strength and fracture toughness in case the semiproduct has the thickness more than 60 mm. Therefore when irregular-shaped members (fittings, landing gear elements, etc) are to be manufactured from said alloy, the great difficulties arise in the process of mechanical working.

25 Pechiney of France also has claimed several alloys of Al-Zn-Mg-Cu system. The alloy described in EP 0391815 comprises (in mass.%):

Zn 5.5-8.45 Si ≤ 0.5

Mg 2.0-3.5 Fe ≤ 0.5

Cu 0.5-2.5 other elements 0.05 each but not more

30 Cr 0.3-0.6 than 0.15 in total amount

Mn 0.3-1.1 Al-balance

This alloy is intended to be used for producing small-sized semiproducts (sheets, plates, extruded articles) prepared by powder metallurgy method.

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The disadvantage of such products is the low level of fracture toughness (K_{IC}) and low technological properties.

The high strength Al alloy described in PCT/FR 97/00144 comprises (in mass.%):

5	Zn 5.9-8.7	Si < 0.11
	Mg 1.7-2.5	Fe < 0.14
	Cu 1.4-2.2	Zr 0.05-0.15
	Cr < 0.02	Mg+Cu < 4.1
	Mn < 0.02	Al-balance

The technological properties (flowability, technological plasticity) of this alloy are insufficient, and besides it has a reduced level of fracture toughness (K_{IC}).

The articles made from this alloy (i.e. fittings, frames) have non-uniform strength properties and fracture toughness upon thickness particularly in case of large sections.

Description of the Invention.

The object of the present invention is to provide aluminium-based alloy of Al-Zn-Mg-Cu system having the improved combination of properties such as flowability, technological plasticity, increased fracture toughness, and also ensuring the uniformity of mechanical properties and fracture toughness upon product's thickness while preserving high levels of strength properties, and to provide the articles made from said alloy with said properties.

Accordingly, there is provided Al-Zn-Mg-Cu alloy comprising (in mass.%):

25	Zn 6.35-8.0	Si 0.01-0.2
	Mg 0.5-2.5	Fe 0.06-0.25
	Cu 0.8-1.3	Zr 0.07-0.2
	Cr 0.001-0.05	Ti 0.03-0.1
	Mn 0.001-0.1	Be 0.0001-0.05

at least one element from the group consisting of alkali-earth metals:

30	K 0.0001-0.01
	Na 0.0001-0.01
	Ca 0.0001-0.01

Al-balance

$Zr+2Ti \leq 0.3$ and $Si:Be \leq 2$

and the article made thereof.

Alloying of the claimed alloy with additional elements – Be and at least one element from the group consisting of alkali-earth metals - K, Na, Ca, leads to increase in melt flowability upon casting due to their interaction with blisters and hydrogen being present in the metal, which in turn allows to perform melt filtration and degassing more effectively, that means to increase its purity and, as a result, to improve the technological plasticity of ingots.

The optimum ratio of Zr and Ti combined with lower amount of Cu and in presence of at least one of the alkali-earth metals- K, Na, Ca, provide improved level of fracture toughness while preserving high level of strength properties due to the reduction of volume content of primary phases and their refining, and also provide great uniformity of mechanical properties and fracture toughness upon product's thickness owing to more uniform distribution of secondary phases' particles in micrograin's volume, which ensures better hardenability of the present alloy.

Embodiments of the present invention will now be described by way of example.

Example.

For the purpose of the experiments, the ingots were cast from the alloys, the compositions of which are given in Table 1.

The alloys 2-9 are embodiments of the present invention (the present alloys or the claimed alloys), and the alloy 1 – invention of PCT/FR 97/00144.

The hand forgings of 60, 100, 150, 200 mm thickness (t) were made from homogenized ingots by the method of upsetting on a vertical press and the strips of 50 and 130 mm thickness (t) were made by extrusion on a horizontal press.

Semiproducts were heat treated as follows: solution heat treatment at temperature of 470°C, time (depending upon semiproduct's thickness) varied from 1 to 3 hours; and water-quenching under temperature 15°C for 6 hours and further under 170°C for within 10 hours.

The alloys flowability was estimated by conventional method by the length of a straight rod cast into a metallic mold.

The technological plasticity was estimated by two methods: by upsetting the cylindrical samples on a press until a side crack appeared, and by tensile testing the conventional cylindrical samples.

The strength properties and fracture toughness of the alloys were estimated on conventional samples cut from different zones upon the thickness (t) of the semiproducts

(1/4 t and 1/2 t) in longitudinal (L or L-T) and short transverse (S or S-L) directions relative to fiber direction.

Table 2 shows the results of testing for technological properties' estimation of the alloys of the present invention and the prior art.

The results given in this Table evidently show that the present alloy (compositions 2-9) 1,2-1,4 times exceeds the known alloy in flowability and technological plasticity.

Table 3 shows the properties of a central zone of the forgings with 150 mm thickness made of the present alloy and the known alloy. One can evidently see from Table 3, that the present alloy 1.4-1.7 times exceeds the known alloy in fracture toughness in L-T direction, and 1.2-1.4 times - in S-T direction while the strength properties of both alloys are nearly the same. The best values of fracture toughness were defined on the alloys 3-5, 7, 9 which had ratios $Ti+2Zr \leq 0.3$ and $Si:Be \geq 2$.

Table 4 shows the mechanical properties of semiproducts with different thicknesses made of the present alloy and of the prior art alloy. The data of Table 4 shows that the present alloy as compared with the known alloy, provides more uniform mechanical properties and fracture toughness upon semiproducts' thickness what can especially be seen on large section samples with thickness of ≥ 150 mm; said samples show 1,5-2 times less reduction of strength properties and fracture toughness as compared with the known alloy.

The present alloy having improved flowability, technological plasticity, fracture toughness, and also more uniform strength properties and fracture toughness upon thickness, allows to produce wide range of semiproducts (forged, extruded and rolled) practically of any shape and dimensions, especially of large section.

The large-sized integral articles having uniform properties made of the present alloy will allow to increase by 10-20% the weight efficiency of the structure due to reduction of riveted joints' number and will ensure 15-20% increase of service reliability owing to improved fracture toughness.

The improvement of technological properties of the present alloy will ensure reduction of faulty production from said alloy, and use of large-sized semiproducts in aircraft structure will reduce labour intensity of assembling and will make the aircraft more economical by 30-40%.

Producing and use of the present alloy and articles thereof do not deteriorate environment from the ecological point of view.

Table 1

Compositions of experimental alloys

№ п/п	Alloy	Compositions, mass. %													
		Zn	Mg	Cu	Fe	Si	Zr	Mn	Cr	Ti	Be	K	Na	Ca	Al
1	Prior Art	6,7	2,0	1,4	0,1	0,05	0,11	0,02	0,02	-	-	-	-	-	balance
2	Inven- tion	8,0	2,5	1,3	0,25	0,2	0,2	0,1	0,05	0,1	0,05	0,01	0,01	0,01	“-
3		7,0	2,0	1,1	0,13	0,1	0,13	0,05	0,03	0,06	0,025	0,005	0,005	0,005	“-
4		6,35	0,5	0,8	0,06	0,01	0,07	0,001	0,001	0,03	0,0001	0,0001	0,0001	0,0001	“-
5		6,75	1,9	1,2	0,12	0,06	0,13	0,02	0,02	0,07	0,03	-	-	0,008	“-
6		6,8	2,0	1,0	0,14	0,03	0,12	0,04	0,03	0,07	0,03	-	0,01	-	“-
7		6,9	1,9	1,1	0,07	0,06	0,1	0,005	0,04	0,04	0,003	0,003	-	-	“-
8		7,0	2,0	1,1	0,13	0,03	0,13	0,05	0,02	0,05	0,042	0,005	-	0,01	“-
9		7,1	1,9	1,2	0,12	0,06	0,13	0,05	0,04	0,06	0,007	-	0,0005	0,0007	“-

Table 2

Technological properties of experimental alloys

Alloy	Flowability, mm	Technological plasticity, %	
		upon upsetting on a press	upon tensile
1 Prior Art	270	70	85
2	360	89	135
3	370	94	140
4	370	97	138
5	380	95	135
6	365	87	133
7	375	95	145
8	360	88	135
9	385	95	143

5

Table 3

Properties of hand forgings with 150 mm thickness in central zone (1/2t)

Alloy	UTS, MPa		YTS, MPa		K_{IC} MPa \sqrt{m}	
	L	ST	L	ST	L-T	S-L
1 Prior Art	490	467	420	405	31,5	26,2
2	528	515	485	477	45,3	31,5
3	520	510	483	470	47,5	33,0
4	495	490	448	442	50,1	34,5
5	505	490	450	440	47,7	34,3
6	508	491	451	443	45,6	32,9
7	509	489	455	450	47,0	34,0
8	512	493	450	448	46,9	32,0
9	502	495	455	450	47,5	34,5

Table 4

Mechanical properties of semiproducts with different thicknesses made of experimental alloys

Alloy	Semi-product	Thickness (t), mm	YTS(L), MPa		K _{1C} (L-T), MPa \sqrt{m}		YTS(ST), MPa		K _{1C} (S-L), MPa \sqrt{m}	
			1/4t	1/2t	1/4t	1/2t	1/4t	1/2t	1/4t	1/2t
Prior Art	Hand Forging	60	470	468	-	37,1	-	445	-	30,1
		100	465	455	37,2	34,2	440	438	440	29,3
		150	440	430	35,0	31,5	425	400	425	26,2
		200	435	416	32,1	28,3	410	390	410	23,0
Suggested composition (№5)	Extrusion	60	470	468	-	36,3	-	461	-	32,1
		130	455	430	35,7	33,1	440	415	440	30,8
	Hand Forging	60	471	468	-	51,0	-	465	-	35,0
		100	465	462	49,6	49,1	460	455	460	34,8
		150	455	450	48,3	47,7	445	445	445	34,3
		200	450	445	46,5	46,0	445	435	445	34,0
	Extrusion	60	487	485	-	50,0	-	479	-	36,7
		130	485	485	45	48,0	483	480	483	36,0

CLAIMS

1. High strength alloy of aluminium-zinc-magnesium-copper system comprising
 5 (in mass.%):

Zn 6.35-8.0 Si 0.01-0.2
 Mg 0.5-2.5 Fe 0.06-0.25
 Cu 0.8-1.3 Zr 0.07-0.2
 Cr 0.001-0.05 Ti 0.03-0.1
 10 Mn 0.001-0.1 Be 0.0001-0.05

and at least one element from the group of alkali-earth metals:

K 0.0001-0.01
 Na 0.0001-0.01
 Ca 0.0001-0.01
 15 Al-balance

2. High strength aluminium-based alloy of claim 1, characterized in that the sum
 $Zr+2Ti \leq 0.3 \%$

3. High strength aluminium-based alloy of claim 1,2 characterized in that the ratio
 $Si:Be \geq 2$.

4. The article made of the high strength aluminium-based alloy characterized in that
 20 said alloy has the following composition (mass.%)

Zn 6.35-8.0 Si 0.01-0.2
 Mg 0.5-2.5 Fe 0.06-0.25
 Cu 0.8-1.3 Zr 0.07-0.2
 25 Cr 0.001-0.05 Ti 0.03-0.1
 Mn 0.001-0.1 Be 0.0001-0.05

and at least one element from the group of alkali-earth metals:

K 0.0001-0.01
 Na 0.0001-0.01
 30 Ca 0.0001-0.01
 Al-balance

Abstract**High Strength Aluminium - Based Alloy and the Article Made Thereof**

The invention relates to high strength aluminium - based alloy of Al-Zn-Mg-Cu system and the articles made thereof. The present alloy is characterized by the combination of improved properties: flowability, technological plasticity, fracture toughness while preserving high levels of strength properties.

Said alloy comprises (mass.%):

Zn 6.35-8.0 Si 0.01-0.2

Mg 0.5-2.5 Fe 0.06-0.25

Cu 0.8-1.3 Zr 0.07-0.2

Cr 0.001-0.05 Ti 0.03-0.1

Mn 0.001-0.1 Be 0.0001-0.05

and at least one element from the group of alkali-earth metals:

K 0.0001-0.01

Na 0.0001-0.01

Ca 0.0001-0.01

Al-balance

the sum $Zr+2Ti \leq 0.3\%$, and the ratio $Si:Be \geq 2$.

The invented alloy is suitable for producing large-sized, extruded, rolled and forged semiproduct articles used for manufacture of loaded members of aircraft, cars and other machinery.

COMBINED DECLARATION AND POWER OF ATTORNEY

(ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL, DIVISIONAL,
CONTINUATION, OR C-I-P)

As a below named inventor, I hereby declare that:

TYPE OF DECLARATION

This declaration is of the following type:

(check one applicable item below)

- ☐ original.
☐ design.

NOTE: *With the exception of a supplemental oath or declaration submitted in a reissue, a supplemental oath or declaration is not treated as an amendment under 37 CFR 1.312 (Amendments after allowance). M.P.E.P. Section 714.16, 7th Ed.*

- ☐ supplemental.

NOTE: *If the declaration is for an International Application being filed as a divisional, continuation or continuation-in-part application, do not check next item; check appropriate one of last three items.*

- ☒ national stage of PCT.

NOTE: *If one of the following 3 items apply, then complete and also attach ADDED PAGES FOR DIVISIONAL, CONTINUATION OR C-I-P.*

NOTE: *See 37 C.F.R. Section 1.63(d) (continued prosecution application) for use of a prior nonprovisional application declaration in the continuation or divisional application being filed on behalf of the same or fewer of the inventors named in the prior application.*

- ☐ divisional.
☐ continuation.

NOTE: *Where an application discloses and claims subject matter not disclosed in the prior application, or a continuation or divisional application names an inventor not named in the prior application, a continuation-in-part application must be filed under 37 C.F.R. Section 1.53(b) (application filing requirements-nonprovisional application).*

- ☐ continuation-in-part (C-I-P).

INVENTORSHIP IDENTIFICATION

WARNING: *If the inventors are each not the inventors of all the claims, an explanation of the facts, including the ownership of all the claims at the time the last claimed invention was made, should be submitted.*

My residence, post office address and citizenship are as stated below, next to my name. I believe that I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter that is claimed, and for which a patent is sought on the invention entitled:

TITLE OF INVENTION

High Strength Aluminium Based Alloy and the

Article Made Thereof

SPECIFICATION IDENTIFICATION

The specification of which:

(complete (a), (b), or (c))

(a) ☒ is attached hereto.

NOTE: "The following combinations of information supplied in an oath or declaration filed on the application filing date with a specification are acceptable as minimums for identifying a specification and compliance with any one of the items below will be accepted as complying with the identification requirement of 37 C.F.R. Section 1.63:

"(1) name of inventor(s), and reference to an attached specification which is both attached to the oath or declaration at the time of execution and submitted with the oath or declaration on filing;

"(2) name of inventor(s), and attorney docket number which was on the specification as filed; or

"(3) name of inventor(s), and title which was on the specification as filed."

Notice of July 13, 1995 (1177 O.G. 60).

(b) ☐ was filed on _____, ☐ as Application No. _____
☐ and was amended on _____ (if applicable).

NOTE: Amendments filed after the original papers are deposited with the PTO that contain new matter are not accorded a filing date by being referred to in the declaration. Accordingly, the amendments involved are those filed with the application papers or, in the case of a supplemental declaration, are those amendments claiming matter not encompassed in the original statement of invention or claims. See 37 C.F.R. Section 1.67.

NOTE: "The following combinations of information supplied in an oath or declaration filed after the filing date are acceptable as minimums for identifying a specification and compliance with any one of the items below will be accepted as complying with the identification requirement of 37 C.F.R. Section 1.63:

(A) application number (consisting of the series code and the serial number, e.g., 08/123,456);

(B) serial number and filing date;

(C) attorney docket number which was on the specification as filed;

(D) title which was on the specification as filed and reference to an attached specification which is both attached to the oath or declaration at the time of execution and submitted with the oath or declaration;

or

(E) title which was on the specification as filed and accompanied by a cover letter accurately identifying the application for which it was intended by either the application number (consisting of the series code and the serial number, e.g., 08/123,456), or serial number and filing date. Absent any statement(s) to the contrary, it will be presumed that the application filed in the PTO is the application which the inventor(s) executed by signing the oath or declaration.

M.P.E.P. Section 601.01(a), 7th ed.

- 20020902:052002
- (c) ☒ was described and claimed in PCT International Application No. PCT/RU00/00386 filed on _____ and as amended under PCT Article 19 on _____ (if any).
Sept. 28, 2000

SUPPLEMENTAL DECLARATION (37 C.F.R. Section 1.67(b))

(complete the following where a supplemental declaration is being submitted)

- ☐ I hereby declare that the subject matter of the
- ☐ attached amendment
- ☐ amendment filed on _____.

was part of my/our invention and was invented before the filing date of the original application, above identified, for such invention.

ACKNOWLEDGMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information, which is material to patentability as defined in 37, Code of Federal Regulations, Section 1.56,

(also check the following items, if desired)

- ☐ and which is material to the examination of this application, namely, information where there is a substantial likelihood that a reasonable Examiner would consider it important in deciding whether to allow the application to issue as a patent, and
- ☐ in compliance with this duty, there is attached an information disclosure statement, in accordance with 37 C.F.R. Section 1.98.

PRIORITY CLAIM (35 U.S.C. Section 119(a)-(d))

NOTE: "The claim to priority need be in no special form and may be made by the attorney or agent if the foreign application is referred to in the oath or declaration as required by Section 1.63. The claim for priority and the certified copy of the foreign application specified in 35 U.S.C. Section 119(b) must be filed in the case of an interference (Section 1.630), when necessary to overcome the date of a reference relied upon by the examiner, when specifically required by the examiner, and in all other situations, before the patent is granted. If the claim for priority or the certified copy of the foreign application is filed after the date the issue fee is paid, it must be accompanied by a petition requesting entry and by the fee set forth in Section 1.17(i). If the certified copy is not in the English language, a translation need not be filed except in the case of interference; or when necessary to overcome the date of a reference relied upon by the examiner; or when specifically required by the examiner, in which event an English language translation must be filed together with a statement that the translation of the certified copy is accurate." 37 C.F.R. Section 1.55(a).

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

(complete (d) or (e))

- (d) ☒ no such applications have been filed. .
(e) ☐ such applications have been filed as follows.

NOTE: Where item (c) is entered above and the International Application which designated the U.S. itself claimed priority check item (e), enter the details below and make the priority claim.

**PRIOR FOREIGN/PCT APPLICATION(S) FILED WITHIN 12 MONTHS
(6 MONTHS FOR DESIGN) PRIOR TO THIS APPLICATION
AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. SECTION 119(a)-(d)**

COUNTRY (OR INDICATE IF PCT)	APPLICATION NUMBER	DATE OF FILING DAY, MONTH, YEAR	PRIORITY CLAIMED UNDER 35 USC 119
RU	99120975	05.10.1999	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO
			<input type="checkbox"/> YES <input type="checkbox"/> NO

CLAIM FOR BENEFIT OF PRIOR U.S. PROVISIONAL APPLICATION(S)
(35 U.S.C. Section 119(e))

I hereby claim the benefit under Title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below:

PROVISIONAL APPLICATION NUMBER

_____/_____
_____/_____
_____/_____

FILING DATE

CLAIM FOR BENEFIT OF EARLIER U.S./PCT APPLICATION(S)
UNDER 35 U.S.C. SECTION 120

- [] The claim for the benefit of any such applications are set forth in the attached ADDED PAGES TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR DIVISIONAL, CONTINUATION OR CONTINUATION-IN-PART (C-I-P) APPLICATION.

ALL FOREIGN APPLICATION(S), IF ANY, FILED MORE THAN 12 MONTHS
(6 MONTHS FOR DESIGN) PRIOR TO THIS U.S. APPLICATION

NOTE: If the application filed more than 12 months from the filing date of this application is a PCT filing forming the basis for this application entering the United States as (1) the national stage, or (2) a continuation, divisional, or continuation-in-part, then also complete ADDED PAGES TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR DIVISIONAL, CONTINUATION OR C-I-P APPLICATION for benefit of the prior U.S. or PCT application(s) under 35 U.S.C. Section 120.

POWER OF ATTORNEY

I hereby appoint the following practitioner(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

(list name and registration number)

JOSEPH H. HANDELMAN, 26179

RICHARD P. BERG, 28145

12 JOHN RICHARDS, 31053

JULIAN H. COHEN, 20302

RICHARD J. STREIT, 25765

WILLIAM R. EVANS 25858

PETER D. GALLOWAY, 27885

JANET I. CORD, 33778

IAN C. BAILLIE, 24090

CLIFFORD J. MASS, 30086

THOMAS F. PETERSON, 24790

CYNTHIA R. MILLER, 34678

(Check the following item, if applicable)

[] I hereby appoint the practitioner(s) associated with the Customer Number provided below to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

[] Attached, as part of this declaration and power of attorney, is the authorization of the above-named practitioner(s) to accept and follow instructions from my representative(s).

NOTE: "Special care should be taken in continuation or divisional applications to ensure that any change of correspondence address in a prior application is reflected in the continuation or divisional application. For example, where a copy of the oath or declaration from the prior application is submitted for a continuation or divisional application filed under 37 CFR 1.53(b) and the copy of the oath or declaration from the prior application designates an old correspondence address, the Office may not recognize, in the continuation or divisional application, the change of correspondence address made during the prosecution of the prior application. Applicant is required to identify the change of correspondence address in the continuation or divisional application to ensure that communications from the Office are mailed to the current correspondence address. 37 CFR 1.63(d)(4)." Section 601.03, M.P.E.P., 7th Ed.

SEND CORRESPONDENCE TO

DIRECT TELEPHONE CALLS TO:
(Name and telephone number)

Ladas & Parry
26 West 61st Street
New York, N.Y. 10023

(complete the following if applicable)

Since this filing is a [] continuation [] divisional there is attached hereto a Change of Correspondence Address so that there will be no question as to where the PTO should direct all correspondence.

DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

SIGNATURE(S)

NOTE: Carefully indicate the family (or last) name, as it should appear on the filing receipt and all other document.

NOTE: Each inventor must be identified by full name, including the family name, and at least one given name without abbreviation together with any other given name or initial, and by his/her residence, post office address and country of citizenship. 37 C.F.R. Section 1.63(a)(3).

NOTE: Inventors may execute separate declarations/oaths provided each declaration/oath sets forth all the inventors. Section 1.63(a)(3) requires that a declaration/oath, inter alia, identify each inventor and prohibits the execution of separate declarations/oaths which each sets forth only the name of the executing inventor. 62 Fed. Reg. 53,131, 53,142, October 10, 1997,

1-0 Full name of sole or first inventor

Iosif Naumovich Flidlyander
(Given Name) (Middle Initial or Name) Family (Or Last Name)

Inventor's signature Иосиф Наумович Флидландер

Date April 01, 2002 Country of Citizenship Russian Federation

Residence Russian Federation, Moscow

Post Office Address Russian Federation, Moscow, Volokolamskoe shosse, 15/22, kv. 66 LVX

2-0 Full name of second joint inventor, if any

Evgeny Nikolaevich Kablov
(Given Name) (Middle Initial or Name) Family (Or Last Name)

Inventor's signature Евгений Николаевич Каблов

Date April 01, 2002 Country of Citizenship Russian Federation

Residence Russian Federation, Moscow RYV

Post Office Address Russian Federation, Moscow, Potapovsky per., 12, kv. 29

3-0 Full name of third joint inventor, if any

Evgeniya Anatolievna Tkachenko
(Given Name) (Middle Initial or Name) Family (Or Last Name)

Inventor's signature Евгения Анатольевна Ткаченко

Date April 01, 2002 Country of Citizenship Russian Federation

Residence Russian Federation, Moscow

Post Office Address Russian Federation, Moscow, ul. B.Pirogovskaya 53/55, kv. 34 RYA

(check proper box(es) for any of the following added page(s)
that form a part of this declaration)

☒ **Signature** for fourth and subsequent joint inventors. Number of pages added 1

* * *

☐ **Signature** by administrator(trix), executor(trix) or legal representative for deceased or incapacitated inventor. Number of pages added _____

* * *

☐ **Signature** for inventor who refuses to sign or cannot be reached by person authorized under 37 C.F.R. Section 1.47. Number of pages added _____

* * *

☐ Added page for **signature** by one joint inventor on behalf of deceased inventor(s) where legal representative cannot be appointed in time. (37 C.F.R. Section 1.47)

* * *

☐ Added pages to combined declaration and power of attorney for divisional, continuation, or continuation-in-part (C-I-P) application.

☐ Number of pages added _____

* * *

☐ Authorization of practitioner(s) to accept and follow instructions from representative.

(If no further pages form a part of this Declaration,
then end this Declaration with this page and check the following item)

☐ This declaration ends with this page.

SIGNATURE(S)

NOTE: Carefully indicate the family (or last) name, as it should appear on the filing receipt and all other document.

NOTE: Each inventor must be identified by full name, including the family name, and at least one given name without abbreviation together with any other given name or initial, and by his/her residence, post office address and country of citizenship. 37 C.F.R. Section 1.63(a)(3).

NOTE: *Inventors may execute separate declarations/oaths provided each declaration/oath sets forth all the inventors. Section 1.63(a)(3) requires that a declaration/oath, inter alia, identify each inventor and prohibits the execution of separate declarations/oaths which each sets forth only the name of the executing inventor. 62 Fed. Reg. 53,131, 53,142, October 10, 1997.*

Full name of forth inventor

<u>Vladimir</u> <i>(Given Name)</i>	<u>Nikolaevich</u> <i>(Middle Initial or Name)</i>	<u>Samonin</u> <i>Family (Or Last Name)</i>
--	---	--

Inventor's signature *Владимир Николаевич Саченко*

Date April 10, 2002 **Country of Citizenship** Russian Federation

Residence Russian Federation, Samara

Post Office Address Russian Federation, Samara, ul. Dimitrova, 5,
kv. 1

Full name of fifth inventor

<u>Viktor</u> <i>(Given Name)</i>	<u>Yakovlevich</u> <i>(Middle Initial or Name)</i>	<u>Valkov</u> <i>Family (Or Last Name)</i>
--------------------------------------	---	---

Inventor's signature *Бактёр Габеевич Баликов*

Date April 01, 2002 **Country of Citizenship** Russian Federation

Residence Russian Federation, Samara

Post Office Address Russian Federation, Samara, prospekt
Metallurgov, 54, kv. 22

Full name of _____

(Given Name) (Middle Initial or Name) Family (Or Last Name)

Inventor's signature _____

Date _____ **Country of Citizenship** _____

Residence _____

Post Office Address _____